



GEANEY ENGINEERING CONSULTANTS

PROFESSIONAL BUILDING SERVICES & ENERGY REDUCTION CONSULTANTS

MECHANICAL EQUIPMENT SCHEDULE

***PROJECT NAME: Emergency Works Scheme
Boiler Upgrade at Castleknock Community College
Carpenterstown Road, Castleknock, Dublin 15***

PROJECT REFERENCE: 0835

PROJECT STAGE: 2B Tender

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1.1 GENERAL REQUIREMENTS

All equipment shall be supplied by manufacturers and suppliers who meet the following minimum requirements:

1. References and Proven Performance

- Suppliers shall provide, on request, a minimum of ten satisfactory references for previous installations utilising the same or similar equipment.

2. Fitness for Purpose and Environmental Suitability

- All equipment shall be demonstrably suitable for its intended function and capable of reliable operation under the environmental and weather conditions prevailing at the project site.

3. Regulatory and Standards Compliance

- All equipment and associated systems shall comply with all relevant statutory regulations, including the current Irish Building Regulations, associated Technical Guidance Documents and all applicable DoEY TGD/SDG Documents, EU directives and industry standards.
- All plant and equipment shall bear the CE mark or equivalent approved certification where applicable.

4. Technical Support

- Suppliers shall provide a technically competent representative who is fully knowledgeable in the design, installation, commissioning, and operation of the proposed equipment.

5. Triple E Scheme Compliance

- Where applicable, equipment falling under a Triple E technology category shall be listed on the Triple E Register or shall meet all criteria defined for that technology.

WARRANTIES

- The contractor shall provide manufacturer warranties or extended warranties for all equipment for a minimum period of 15 months beyond Practical Completion.
- Warranty documents shall be submitted as part of the handover documentation.

NOTES

- Schedules must be read in conjunction with relevant parts of the Mechanical Specification.
- The contractor shall ensure all proposed equipment fully complies with this specification before procurement.
- Any equipment installed that does not comply with the specification shall be removed and replaced at the contractor's cost.
- References to "equipment" include all plant, components, accessories, and materials.
- All required as-built documentation, commissioning sheets, and certification shall be submitted.
- Alternative products must be submitted for approval with full datasheets. No substitutions may be installed without prior written approval from the Engineer.

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1. GAS FIRED BOILER

Reference	B-01
Quantity	1
Description	Floor-standing, multi-burner modular condensing boiler
Specification	Immergas ARES 440 TEC ErP or equivalent
Fuel	Natural Gas
Gas Valve	4No. Modulating premix gas valves
Burner Type	4No. Fully premixed stainless-steel burners
Combustion Chamber	4No Sealed, pressurised combustion chambers
Heat Exchanger	4No Cast aluminium-silicon-magnesium alloy
Flue Fan	4No Variable-speed premix fan
Hydraulic Unit	Integral primary hydraulic manifold complete with sensors and condensate system; External INAIL hydraulic safety kit comprising stainless steel plate heat exchanger, circulation pump, expansion vessel, safety valve assembly, Pressure switches, Flow switch, Pressure gauge, Temperature gauge, Automatic air vent, Isolation valves and drain valves.
Safety Devices	High-limit thermostat, pressure sensors, safety valve, flame supervision, condensate safety controls
Control Panel	Digital microprocessor control with LCD display
Max. Nominal Heat Input (kW)	432.0 kW
Min. Nominal Heat Input (kW)	22.0 kW
Max. Useful Heat Output (80/60°C) (kW)	424.3 kW
Min. Nominal Heat Output (80/60°C) (kW)	20.6kW
Efficiency at 100% Pn (80/60°C)	98.21%
Efficiency at 30% of the load (80/60°C)	96.60%
Casing losses with burner on (100% Pn) (80/60°C)	0.10%
Casing losses with burner on (P min) (80/60°C)	5.04%
Casing losses with burner off	0.10%
Adjustable central heating temp.	25-85°C
High Limit Set Point °C	90°C
Max. Operating Pressure	6bar
Boiler Water Content	73L
Net - gross boiler weight	585 - 536kg
Electrical	230/1/50Hz
Maximum absorbed electric power	626W
Minimum absorbed electric power	54W
Gas flow rate at Methane Burner	2.33 - 45.68 m3/hr
Ambient operating range	0 to 40°C
CO2 at the Max. Heat Input	9.1%
CO2 at the Min. Heat Input	9.1%
CO at Maximum Heat Input	93.1mg/kWh
CO at Minimum Heat Input	1.4mg/kWh
Nox at the Maximum Heat Input	68mg/kWh
Nox at Minimum Heat Input	46mg/kWh
Weighted CO G20	26.3mg/kWh
Weighted Nox G20	47mg/kWh
Nox Class	6
CO2 at the Maximum Heat Input	8.8%

CO2 at Minimum Heat Input	8.8%
Design Flow Temp	80°C
Design Return Temp	60°C
Flue Connection Size	DN250
Gas Connection	DN50
Condensate Connection	40mmØ
System Flow Connection	DN100
System Return Connection	DN100

Notes:

1. Boiler to be fully automatic.
2. Boiler to be controlled via the BMS system.
3. All boilers to come complete with high temperature cut out.
4. Boiler burners to be fully modulating.

2. BOILER FLUE

Reference	Description
B-01	Boiler Flue shall be Type B23 configuration, as defined by European standard EN 1749. Combustion air shall be drawn from the environment where it is installed. The flue gas exhaust shall be ducted directly to external with a 316L Twin wall insulated Flue and Flexible 316L twin wall liner in accordance with EN 1856-2 T200 P1 as indicated on drawings.

Notes:

1. The detailed design, structural stability including all anchoring of the flue arrangement shall be the sole responsibility of the Contractor.
2. All Changes of direction in flues must be limited to a maximum angle of 45°
3. Include for all weathering required for wall and or roof penetrations.

3. HEAT EXCHANGER

Reference	Description	Maximum managed power	Primary Flow rate 80°/65°	Secondary Flow rate 70°/60°	Max. Operating Pressure	Connections	
						Primary	Secondary
HEX-01	316L Stainless Steel Plate Heat Exchanger c/w EPDM gaskets	660kW	26 m3/hr	38 m3/hr	10 bar	DN100	DN100

4. PRESSURISATION UNIT

Reference	Description	Top-up Flow Rate	Pressure Range	Connections	Volt Free Contacts	Electrical	Specification
PU-01	Floor mounted Mild Steel CR4 Powder Coated Twin pressurisation unit with 2 Pumps and 18 litre internal Polypropylene break tank (Fluid Protection Category 5)	up to 18 L/min	1 - 3 bar	2 x 15mm System 15mm Mains Supply 22mm Overflow	Comms Alarm High Pressure Alarm Low Pressure Alarm Sensor Health Pump 1 Health Pump 2 Health	220V-240V/1/50Hz	Flamco Flexfiller Twin System 2x125D or Equivalent

5. EXPANSION VESSELS

Reference	Description	Capacity	Static Head	Max. Operating Pressure	Max. Operating Temp.	Specification
EV-01	Expansion Vessel for sealed heating system with Flexible Diaphragm in accordance with EN12828. Expansion Vessel shall be Steel Welded Construction finished in Red epoxy-powder coating	35L	4m	6 bar	110°C	Flamco Flexcon 35 or Equivalent
EV-02	Expansion Vessel for sealed heating system with Flexible Diaphragm in accordance with EN12828. Expansion Vessel shall be Steel Welded Construction finished in Red epoxy-powder coating	600L	4m	6 bar	110°C	Flamco Flexcon 600 or Equivalent
EV-03	Expansion Vessel for Potable Water with EPDM Diaphragm and Stainless Steel Flange in accordance with EN13831. Expansion Vessel shall be Steel Welded Construction finished in White epoxy-powder coating	150L	6m	10 bar	110°C	Flamco Flofix 150/2.7 or Equivalent

Notes:

1. Expansion Vessels shall be in accordance with pressure Equipment Directive 2014/68/EU
2. The Contractor shall specify pre-charge when ordering.

6. DOSING POT

Reference	Description	Capacity	Max. Operating Pressure	Connections	Specification
DP-01	Mild steel chemical dosing pot assembly c/w tundish, vessel, air vent, inlet, outlet and drain valves.	6L	16 bar	G 3/4" F	Flamco or Equivalent

7. AIR DIRT SEPERATOR

Reference	Description	Capacity	Max. Operating Pressure	Connections	Specification
ADS-01	Combined Air/Dirt Separator Constructed from Steel wite Steel Neodymium Super magnets, blow-off valve and drain valve c/w Insulation set	33L	10 bar	DN100	Flamcovent Clean Smart 100 S c/w Flamcovent Clean IsoPlus or Equivalent

8. CIRCULATING PUMPS

Reference	Description	Required Flow Rate of each pump	Max. Operating Pressure	Materials		Connections	Electrical	Specification	Control
P-01	High-efficiency in-line Smart glandless twin-head circulating Pump with EC motor and integrated electronic power adjustment Green Button Technology and graphic display Motor protection with trip electronics Plug connection for functional extension c/w additional CIF-module for building automation	5.1kg/s @ 40kPa ESP	10 bar	Pump housing	Grey cast iron	DN65	230V/1/50Hz	Wilo Stratos MAXO-D 65/0,5-12 PN 6/10 or Equivalent	BMS
				Impeller	PPS-GF40				
				Shaft	1.4028, DLC-coated				
				Bearing	Carbon, antimony-impregnated				
P-02	High-efficiency in-line Smart glandless circulating Pump with EC motor and integrated electronic power adjustment Green Button Technology and graphic display Motor protection with trip electronics Plug connection for functional extension c/w additional CIF-module for building automation	5.1kg/s @ 40kPa ESP	10 bar	Pump housing	Grey cast iron	DN65	230V/1/50Hz	Wilo Stratos MAXO-D 65/0,5-12 PN 6/10 or Equivalent	BMS
				Impeller	PPS-GF40				
				Shaft	1.4028, DLC-coated				
				Bearing	Carbon, antimony-impregnated				

P-03	High-efficiency in-line Smart glandless circulating Pump with EC motor and integrated electronic power adjustment Green Button Technology and graphic display Motor protection with trip electronics Plug connection for functional extension c/w additional CIF-module for building automation	0.35kg/s @ 25kPa ESP	10 bar	Pump housing Impeller Shaft Bearing	Grey cast iron PPS-GF40 1.4028, DLC-coated Carbon, antimony-impregnated	DN40	230V/1/50Hz	Wilo Stratos MAXO-D 40/0.5-8 PN 6/10 or Equivalent	BMS
P-04	High-efficiency in-line Smart glandless circulating Pump with EC motor and integrated electronic power adjustment Green Button Technology and graphic display Motor protection with trip electronics Plug connection for functional extension c/w additional CIF-module for building automation	3.1kg/s @ 60kPa ESP	10 bar	Pump housing Impeller Shaft Bearing	Grey cast iron PPS-GF40 1.4028, DLC-coated Carbon, antimony-impregnated	DN80	230V/1/50Hz	Wilo Stratos MAXO-D 80/0.5-12 PN 6/10 or Equivalent	BMS
P-05	High-efficiency in-line Smart glandless circulating Pump with EC motor and integrated electronic power adjustment Green Button Technology and graphic display Motor protection with trip electronics Plug connection for functional extension c/w additional CIF-module for building automation	1.2kg/s @ 40kPa ESP	10 bar	Pump housing Impeller Shaft Bearing	Grey cast iron PPS-GF40 1.4028, DLC-coated Carbon, antimony-impregnated	DN50	230V/1/50Hz	Wilo Stratos MAXO-D 50/0.5-12 PN 6/10 or Equivalent	BMS

P-06	High-efficiency in-line Smart glandless circulating Pump with EC motor and integrated electronic power adjustment Green Button Technology and graphic display Motor protection with trip electronics Plug connection for functional extension c/w additional CIF-module for building automation	3.1kg/s @ 60kPa ESP	10 bar	Pump housing Impeller Shaft Bearing	Grey cast iron PPS-GF40 1.4028, DLC-coated Carbon, antimony-impregnated	DN80	230V/1/50Hz	Wilo Stratos MAXO-D 80/0.5-12 PN 6/10 or Equivalent	BMS
P-07	High-efficiency in-line Smart glandless circulating Pump suitable for Potable Water with EC motor and integrated electronic power adjustment Green Button Technology and graphic display Motor protection with trip electronics Plug connection for functional extension c/w additional CIF-module for building automation	0.4kg/s @ 50kPa ESP	10 bar	Pump housing Impeller Shaft Bearing	Stainless steel PPS-GF40 Stainless steel Carbon-graphite	DN25	230V/1/50Hz	Wilo Stratos MAXO-Z 25/0,5-8 PN 10 or Equivalent	BMS

Notes:

1. All Pumps to be supplied by Wilo or equivalent
2. All pumps to be high energy efficiency
4. Commissioning to be provided by a manufacturer approved service provider only.
5. The Mechanical Sub-Contractor verify and confirm that the equipment selection and system design is correct before installation
6. BMS MODUBS interface to be included as standard. BACNET comm module to be added per pump head.
7. Pumps to be provided with all ancillary equipment for complete installation, commissioning and operation of the system in line with manufacturers' requirements.
8. Energy efficiency index (EEI) of all pumps shall be ≤ 0.18

9. COLD WATER BOOSTER

Reference	Description	Required Flow Rate	Max. Operating Pressure	Materials		Connections	Electrical	Specification	Control
BS-01	Twin pressure booster pump suitable for Potable Water c/w diaphragm pressure vessel in accordance with DIN 1988 and DIN EN 806. Consisting of non-self-priming, switched in parallel, horizontal stainless steel high-pressure multistage centrifugal pumps. Ready for connection with stainless steel pipework, mounted on a base frame, including integrated control by the frequency converter with all necessary measuring and control devices.	3.15m ³ /hr @ 360kPa ESP	10 bar	Pump housing	Stainless steel	R 1½	400V/1/50Hz	Wilo Isar MODH1-E-2-CH3-LE-404 or Equivalent	BMS
				Impeller	Stainless steel				
				Shaft	Stainless steel				
				Gasket material	EPDM				

10. HOT WATER STORAGE CYLINDER

Reference	Description	Required Capacity	Max. Operating Pressure	Insulation	Coil	Electric Immersion Heater	Cathodic protection	Connections	Specification
HWSC-01	316L Stainless steel indirect double coil hot water storage cylinder suitable for use in open vented system c/w sanitary inspection flange	1000L	6 Bar	Factory Fitted 100mm thickness Rigid polyurethane + pvc: Fire resistance class B3 (DIN 4102)	Inox AISI 316L Coils shall deliver minimum 1.5 hour recovery from 30°C to 60°C	9kW 3 phase titanium immersion heater with 24" immersed length c/w high limit cut-out and thermostat	Magnesium anode	1"1/2 for Domestic Hot Water Service 1"1/2 for Domestic Cold Water Feed 1/2" for recirculation 2 x 1" for Primary Hot Water (both coils) 2 x 1/2" for instruments 1"1/4 for Anode 1"1/2 for Elec. Immersion	TML DSFI 01000 R or Equivalent

Notes:

1. All components shall comply with the requirements of BS 8558:2015
2. Hot Water Generation is to be time scheduled at BMS

11. MOTORISED DIVERTING VALVE

Reference	Description	Nominal Diameter	Max. Operating pressure	Max. Operating temperature	Max. Leakage Rate	Valve characteristic	Min. Kvs value	Max Pressure Differential	Connections	Electrical	Specification	Control
MDV-01	3 port lift and lay type line size brass bodied valve for Priority Hot Water, plug with PTFE sealing ring, stainless-steel spindle, stuffing box with double O-ring seal, PN16 rated with 24V motorised actuator for diverting control (Actuating power 250N)	DN40	16 bar	100°C	≤ 0.05% of kvs value	Equal percentage	22 m³/h	120kPa	G2¼" B	24V	Sauter BUN040F300 c/w AVM105F122 actuator or equivalent	Immersion Stat in Hot Water Cylinder/Time control at BMS

12. MOTORISED MIXING VALVES

Reference	Description	Nominal Diameter	Max. Operating pressure	Max. Operating temperature	Leakage Rate	Valve characteristic, mixing passage	Kvs value	Connections	Electrical	Specification	Control
MMV-01	3 port Mixing Valve cast iron bodied valve for Weather Compensation, Plugs made of stainless steel with metal-to-metal seal, stainless-steel spindle, Stuffing box made of stainless steel with wiper ring and double O-ring seal made of EPDM, PN16 rated with 24V motorised actuator for mixing control (Actuating power 2000N)	DN80	16 bar	100°C	Class III as per DIN EN 60534-4 (0.001 x kvs)	Linear	100 m ³ /h	Flange as per EN 1092-2, form B	24V	Sauter BQE080F300 c/w AVF234SF232 actuator or equivalent	Outside Temperature Sensor/ BMS
MMV-02	3 port Mixing Valve cast iron bodied valve for Weather Compensation, Plugs made of stainless steel with metal-to-metal seal, stainless-steel spindle, Stuffing box made of stainless steel with wiper ring and double O-ring seal made of EPDM, PN16 rated with 24V motorised actuator for mixing control (Actuating power 1000N)	DN50	16 bar	130°C	Leakage rate, control passage ≤ 0.05% of kvs value	Linear	40 m ³ /h	G2¾" B	24V	Sauter BUN050F200 c/w AVM321SF132 actuator or equivalent	Outside Temperature Sensor/ BMS
MMV-03	3 port Mixing Valve cast iron bodied valve for Weather Compensation, Plugs made of stainless steel with metal-to-metal seal, stainless-steel spindle, Stuffing box made of stainless steel with wiper ring and double O-ring seal made of EPDM, PN16 rated with 24V motorised actuator for mixing control (Actuating power 2000N)	DN80	16 bar	100°C	Class III as per DIN EN 60534-4 (0.001 x kvs)	Linear	100 m ³ /h	Flange as per EN 1092-2, form B	24V	Sauter BQE080F300 c/w AVF234SF232 actuator or equivalent	Outside Temperature Sensor/ BMS

13. FIRE EXTINGUISHERS

Description	Specification	Quantity
6L AFFF Fluorine-free spray foam portable fire extinguisher	Moyne Roberts MF-60 or Equivalent	1
6kg dry powder portable fire extinguisher	Moyne Roberts MP-6 or Equivalent	1

Notes:

1. Fire extinguishers shall be manufactured to BS EN 3.
2. Fire extinguisher installation shall be in accordance with IS 291:2015 'selection, commissioning, installation, inspection and maintenance of portable fire extinguishers'.
3. Provide wall brackets for all extinguishers and allow for mounting all extinguishers.
4. All fire points shall have suitable signage which mark locations in accordance with IS 291 2015 and the safety, health and welfare at work act (1995) regulations. Particular attention should be paid to fire points not in direct view.
5. Extinguisher I.D. tags shall be displayed above each extinguisher which explains uses and hazards in accordance with IS 291 2015.
6. Provide a fire assembly point sign and mount externally in the location indicated by the Employer's Representative

14. WATER CHECK METERS

Location	Description	Measuring range	Output	Max. Operating Temp	Max. Operating Temp	Connections	Specification
WM-01	In-line rotary piston Water check meter suitable for potable water with Pulse Output Module	0.0127 to 4 [m ³ /h]	Wired Pulse Output	30°C	16 Bar	DN20	Elster Honeywell V200 or Equivalent
WM-02	In-line rotary piston Water check meter suitable for potable water with Pulse Output Module	0.1 to 16 [m ³ /h]	Wired Pulse Output	30°C	16 Bar	DN40	Elster Honeywell V200 or Equivalent

15. GAS CHECK METER

Reference	Description	Measuring range	Output	Max. Operating Pressure	Connections	Specification
GM-01	In-line Rotary gas check meter	1.6 to 160 [m ³ /h]	Wired Pulse Output	20bar	DN80	Elster Rabo DN80 G100 Maintenance free Version or Equivalent

16. GAS DETECTION SYSTEM

Reference	Description	Fuel Type	Gas Slam Shut Valve	Fire Alarm Interface	Key release emergency stop button	Detectors	Electrical	Specification
GDP-01	Four Channel Gas Detection Panel with OLED display and integral Emergency Gas Shut off button, mute and reset	NG	Existing Recommissioned	Yes	1	1 x CH4 Detector 1 x CO Detector	220V- 240V/1/50Hz	Medem AGDS-4 or Equivalent

Notes:

1. This Gas Slam Shut Valve should be the normally closed type, with a manual reset button.
2. The gas slam shut valve shall close shut upon failure of mains supply.
3. The gas slam shut valve shall close shut upon detection of Gas or CO.
4. The gas slam shut valve shall close shut upon activation of Fire Alarm.
5. Upon activation of the gas detection system, the gas slam shut valve shall close. A signal shall be sent via an addressable interface to the fire alarm panel indicating activation. The fire alarm shall not go into alarm at this stage.

17. GAS FILTER

Reference	Description	Nominal Diameter	Max. Operating pressure	Max. Flow Velocity	Pore width of filter element	Connections	Specification
FI-01	Gas Filter as per DIN 3386 with high dust storage capacity. EC approved. It shall be c/w G1/4 screw plug measuring gas connections upstream and downstream of filter element.	DN100	4 bar	≤ 20 m/s	≤ 50 µm	Flange connection as per DIN EN 1092-1	Dungs GF 40100/4 or equivalent

18. CONTROLS SYSTEM

Reference	Location	Description	Panel Construction	Max. Dimension
MCC-01	Existing Boiler Room	Motor Control Centre incorporating BMS with Built-in touchscreen on panel door and c/w 25% spare capacity	minimum Form 2B	1200mm Wide x 300mm Deep

MCC-01 will control the following equipment items and have hand/off/auto switches with Run and Trip Indicator

- LPG Boiler (B-01)
- Pressurisation unit (PU-01)
- Dual Circulating Pump (P-01)
- Dual Circulating Pump (P-02)
- Dual Circulating Pump (P-03)
- Dual Circulating Pump (P-04)
- Dual Circulating Pump (P-05)
- Dual Circulating Pump (P-06)
- Secondary Hot Water Circulation Pump (P-07)
- Immersion Element (HWSC-01)
- Spare
- Spare

Time Clock Controls

All plant items shall be capable of time clock control with separate schedules for heating circuits and plant.

Fire Alarm Interface

All panels will be linked via input output modules to the Fire Alarm System. On activation of the Fire Alarm all Boilers and Circulating Pumps shall de-energise

Remote Panel

A remote panel will be provided on the wall of the principal's office that will contain the following:

- A heating override timer with an adjustable range of 0 to 4 hours.
- A push button for all existing and new pumped circuits.
- A lamp for each of the existing heating circuits.

If one of the circuit buttons is pressed and the timer is set, then the heating system will provide heat to the selected circuit for the duration of the timer set time. The zone lamps will not be illuminated unless the timer has been set.